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ABSTRACT

A study investigated the relationship between cognitive style and coherence in discourse. The primary hypothesis was that coherence would vary bimodally by cognitive style classification. Forty-four freshman composition students from three west coast colleges completed the Culture Fair Intelligence Test, the Group Embedded Figures Test, and the PF-16 Personality Assessment. Each subject received linguistic stimuli that called for responses ranging from spontaneous dialogue to monologue to writing. A group of readers unaware of the nature of the research rated each response holistically in terms of coherence. Coherence scores were then analyzed in relation to cognitive style classifications as indicated by the Group Embedded Figures Test. On the basis of cognitive style scores, subjects were sorted into three categories using an SAS sorting algorithm. The first, or field dependent, category contained 17 subjects with cognitive style scores of less than 6. The field independent group contained 15 subjects with scores greater than 6. The third category, which was the norming group, contained 12 subjects with scores of exactly 6. The hypothesis that coherence varied by cognitive style was supported by the data. Field dependent subjects were eight times more likely to produce discourse of low coherence than of high coherence. They were two and a half times more likely to produce discourse of low coherence than were their field independent counterparts. The results suggest that coherence in discourse is largely a developmental phenomenon, not a pedagogical one. (Author/HTH)

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COHERENCE AND COGNITIVE STYLE

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ABSTRACT

The purpose of this research was to investigate the relationship between cognitive style and coherence in discourse. The primary hypothesis was that coherence would vary bimodally by cognitive style classification.

Forty-four subjects in their first term of college composition were selected on a volunteer basis from the University of Southern California, Chemeketa Community College, Salem, Oregon, and the University of California, Los Angeles. Each subject was administered the Culture Fair Intelligence Test, the Group Embedded Figures Test, and the PF-16 Personality Assessment. Each subject received linguistic stimuli that called for responses that ranged from spontaneous dialogue to monologue to writing. A group of readers unaware of the nature of the research evaluated each response holistically, rating it in terms of coherence via a coherence rating scale developed by Bamberg (forthcoming). Coherence scores were then analyzed in relation to cognitive style classification as indicated by the Group Embedded Figures Test.

The hypothesis that coherence varied by cognitive style was clearly supported by the data. Statistical analyses showed that cognitive style effect was highly significant ($p < .005$), accounting for approximately 40% of observed behavior ($R^2 = .409$). Furthermore, field dependent subjects were eight times more likely to produce discourse of low coherence than of high coherence. They were two and a half times more likely to produce discourse of low coherence than their field independent counterparts.

The results suggest that coherence in discourse is largely a developmental phenomenon, not a pedagogical one. Should further research support this notion, it will have significant implications for composition pedagogy.

Introduction

1.1. A Brief Overview. Coherence has received increasing attention since 1975, when the National Assessment of Educational Progress (NAEP) published its report indicating that 13 and 17 year-olds were writing less coherently than their counterparts in 1969. A great deal of the research in this area, however, has focused on cohesion as a device for explaining coherence in discourse. This approach has a certain descriptive value, for it allows one to compare discourse features and itemize what coherent passages have that incoherent ones do not. But it skirts causal and predictive issues—specifically, why some people produce discourse that lacks the characteristics we find in coherent language.

The recent work in discourse pragmatics suggests that relevance and semantic fit are keys to producing coherent discourse. That is, discourse is viewed as a hierarchy of actions, of speech events, and each must be linked to the topic of the discourse if it is to be coherent. Given the turn-taking involved in conversations, irrelevant and potentially incoherent utterances can be reshaped or clarified by either party, thereby ensuring the coherence of the exchange. As the discourse shifts from conversation to, say, limited dialogue or monologue and finally to writing, the decoder's ability to impose coherence disappears and coherence must arise more explicitly from the text, perhaps via inscribed cues that cause or enable decoders to construct a sense of coherence.

At this point we do not know the extent of cuing devices, although function words, transitions, and thematic tags can be identified as structures that have an obvious cuing function. Phelps (in press) argues that incoherence in writing occurs because encoders undercue (providing too few cues for readers to perceive relationships within a text) or because they miscue (providing conflicting or ambiguous cues). This idea suggests to me that the coherent speaker/writer has a different grasp of discourse episodes than does an incoherent speaker/writer. For one thing, it would seem that on some tacit level the former makes use of the difference between meaning and message on the one hand and

substance and performance on the other, while simultaneously utilizing a hierarchy of dominant and subordinate micropropositions that will characterize his discourse.

Abstracting ability would seemingly be important in such processing, but utilizing this ability is complicated by the fact that research in child psychology and ethnopsychology suggests that it is not innate; rather, it is at least partly the product of formal schooling. Education, however, does not appear to provide a guarantee that a person will be inclined to process information abstractly. Nor does maturation. Dasan (1972), for example, reports that only about 30% of American adults manifest the abstracting abilities characteristic of Piaget's "formal operations," a stage presumably reached at about age 11. The reasons for such weak abstracting abilities remain obscure, yet it seems likely that the problem may hinge on cognitive style, i.e., the manner in which a person tends to perceive the world. Persons with a field-dependent cognitive style, inclined as they are to situational processing, would have difficulty moving vertically along the hierarchy of dominant and subordinate micropropositions that characterize discourse. This difficulty would be especially problematic in writing, where coherence is linked to such global notions as topic and audience, as well as to supplying a context for an essentially decontextualized language event.

Furthermore, research in various areas—anthropology, ethnopsychology, neurophysiology, and psycholinguistics—suggests that there may be a relationship between discourse coherence and specific cognitive processes. Given the present lack of any causal analyses of coherence, there is clear need for a study that evaluates discourse and coherence from the standpoint of cognitive style to establish what correlation exists, if any.

1.2. Defining Coherence. When speaking of coherence, we are treading unsteady ground because there are no clear notions of what it is exactly. Part of the problem lies in the fact that any attempt to define "coherence" is hampered by the popular tendency to use "coherent" interchangeably with "cohesive." I believe, however, that these terms

are not synonymous and therefore treat them as distinct concepts.

The rationale behind this decision is relatively straightforward. "Cohesion" has been adopted as a technical term in discourse analysis and is generally used to refer to linguistic features that bind discourse into recognizable units other than single sentences. Halliday and Hasan (1976), for example, use cohesion to refer to the ways in which different sentences in a discourse block can refer to the same entities via reference, substitution, ellipsis, and conjunction.

Following the example set by Hobbs (1978), I am inclined to limit cohesion to syntactic features that connect individual elements of a discourse without operating on the discourse as a whole. In part, this limitation arises from the fact that over the last few years there has been movement away from a purely surface feature analysis of cohesion. Longacre (1980), for instance, sees cohesion as being rooted in the semantic/implicational organization of discourse, while Robinson (1978), Allen and Perrault (1978), and van Dijk (1980) propose a hierarchical relationship between utterances, with "relevance," in the Gricean sense, being the vertical link that joins micropropositions with the macroproposition—the topic—of the language event.

Furthermore, it seems clear that if we pursue this shift to semantics, implicatures, relevance, propositions, and the like, we are moving toward a stance that evaluates cohesion in terms of meaning. I would propose that this is more properly the realm of coherence:

Definition: Coherence is a global property ascribed to a discourse when the decoder judges: a) that it successfully executes the encoder's intentions; and b) that it meets the decoder's expectations of what the discourse should be on the basis of complex hypotheses about the goals, plans, context, and intentions that underlie the language event.

One might immediately object to this definition on the grounds that it is impossible to determine an encoder's intentions on the basis of his discourse. Indeed, some might even object that it fails to account for an instance where an encoder intends to be

incoherent. Yet the more we look at the way people use language, the more specious these objections become.

Note, for example, what Grice (1975: 45) tells us about the Cooperative Principle:

> Our talk exchanges do not normally consist of a succession of disconnected remarks, and would not be rational if they did. They are characteristically, to some degree at least, cooperative efforts; and each participant recognizes in them . . . a common purpose or set of purposes, or at least a mutually accepted direction. . . .

Few readers have trouble accepting this. The suggestion that we are able to determine the purpose of a discourse or of an action (such as a batter hitting a pitch for all he's worth) does not seem novel. In fact, it is almost a commonplace. Searle (1975) uses it as the foundation for his work on indirect speech acts, maintaining that it is only through recognizing the purpose of an utterance that we can distinguish between what was said and what was meant. And Kinneavy (1971: 48) rightly says that "The aim of a discourse determines everything else in the process of discourse." Thus, if an encoder deliberately set about creating an incoherent discourse, the decoder would either recognize the intention in keeping with the Cooperative Principle and glean from it what we might call "coherent incoherence" (consider Hamlet as he feigns madness), or he would not recognize the intention and would dismiss the discourse as incoherent. Either way the definition obtains. There is no implication here, however, that either the purposes we recognize or the act of recognition itself is simple. Frequently we encounter many kinds of discourse in which we recognize a great complexity of purpose.

1.3. Action and Purpose. When I began this research, it was my suspicion that the ability to process abstract information lies at the heart of coherence in discourse. On the basis of Dasan's (1972) data, for example, we would expect vast numbers of people to fail at abstract tasks, manifesting behavior that is characteristic of Piaget's preoperational or concrete operational stages. Such behavior would of course be reflected in language use, especially writing, leading us to expect to find a concrete,

action-bound mode of thinking that is characteristically simple performance. Pianko's (1979) work tends to validate this analysis, for she explicates very well how student writers frequently cannot find a purpose for writing other than their having been ordered to write. The mean composing time for an assignment her subjects had been given all afternoon to compose was 38.85 minutes. When questioned about this, the subjects responded that they had said what they wanted to say in the best way they could. If they had chosen to spend more time, it would have been to make a "neater copy." As Pianko (1979: 29) says, "Such responses revealed a lack of commitment to the writing. A piece of school sponsored writing is something to be written as quickly as possible, and with as little effort as possible." In my view, commitment can only be found in writing that has a purpose, a goal. Yet for too many writers, the act of writing, as opposed to communicating, becomes the goal. Simply having put words down on paper is enough.

Piaget (1974: 142) tells us that the "explanation of concrete behavior begins when one understands that a subject whose perspective is determined by his action has no reason for becoming aware of anything except its results. . . ." Yet written discourse characteristically engenders expectations in the reader that are at odds with a performative framework, at odds with simple graphemic product. Performance cannot be all-important because the writer must encode for message as well as meaning.

Perhaps we can understand this better if we consider an adaptation of Searle's (1979, 1983) hierarchy of intentional action. The complex intentional framework of speech acts includes prior intention (which subsumes illocution and perlocution) and intention in action, the first consisting of performative message, the second of substantive meaning. The ability to abstract allows the encoder to see the possibility of extending prior intention to embrace intention in action. If, however, substantive meaning is not Intentional, it exists as an unintentional action, outside the boundary of intention and volition. For coherence, this suggests that the concrete, context-bound encoder will at least experience difficulty in formulating global relevance and

concomitant semantic fit. Thus, in the hierarchy of actions that characterize speech acts (see Aquila, 1977, Searle, 1979, and van Dijk, 1980) there would be no connection to link sequences of propositions and make them coherent. This is perhaps less significant in oral discourse because the decoder can always interrupt the encoder to ask for clarification of an ambiguous or apparently irrelevant utterance. In written discourse the situation is different, of course. As Labov and Fanshel (1977: 59) state, in discourse "there will be many hierarchical levels of actions, and it is not always clear where the action really is," which implies that in writing, where the opportunity does not exist for interrupting the encoder, conscious effort is required to inscribe hierarchical relationships explicitly. In other words, the top node on the tree of coherence is intention. If writers have no real intention except to generate words, they don't have the requirement for coherence.

1.4. Cognitive Style. Cognitive styles are most generally defined as preferred modes of functioning manifested in perceptual and intellectual activities. Gardner (1962), for example, points out that it is an everyday observation that people vary widely in the span of objects and qualities they are willing to subsume under one conceptual rubric as being "the same" in the sense of being "not different."

Researchers have yet to agree on the exact nature of cognitive style, although the bimodal terms used to describe the phenomenon suggest that is is linked to brain function. Some researchers, for example, use "reflective/impulsive" (Kagan, 1966), others "field independent/dependent" (Witkin et al., 1954, 1962), "analytic/nonanalytic" (Kagan, 1963; Gardner, 1953) or "abstract/concrete" (Bieri, 1955, 1961, 1966, 1969; Harvey et al. 1961; Scott, 1963, 1969, 1974).

What seems more important than a specific label, however, is the behavior that we observe. A person with a field dependent style, for example, will exhibit concrete, situational modes of processing. Kagan, Moss, and Sigel (1963) found that field independent subjects clustered stimuli according to similar elements, such as grouping a

table and a chair together because each has four legs. Field dependent subjects, on the other hand, tended to cluster stimuli according to functional relationships, thus grouping a table and a chair together because they are used for dining (cf. Luria, 1976).

A number of studies suggest that cognitive style is largely developmental. Coates (1972), Gardner and Moriarty (1968), and Messer (1975), for example, report isomorphic continuity of field dependence in preoperational children. At about age 5, a shift toward heterogeneity occurs until stylistic stability is reached at about 7 or 8 years; in fact, Yando and Kagan (1968) report a stability coefficient of .70 for seven-year-olds.

The relevance of the work in cognitive style to questions of coherence is apparent when one places it in the context of the previous discussion of abstracting ability, intentionality, and global features of discourse. Suddenly one perceives a link between all these factors, and the link appears to be the preferential manner in which people process the world around them. This is not to imply that there exist "two kinds" of people, even though the discussion, for the sake of simplicity, may give one that impression; this would require a unitary trait of complexity/simplicity pervading all areas of cognitive functioning. What it does imply is that some people may have difficulty in moving vertically along the hierarchy of intention so that prior intention is rarely fulfilled through intention in action.

1.5. Summary. Before closing this introduction, let's summarize the important points developed in the brief review of the literature. First, we note that discourse can be seen as a hierarchy of actions. If the decoder is to ascribe coherence to the language event, these actions must be relevant to a global topic or macroproposition. Relevance, however, appears to be signaled via cuing devices, the range of which has yet to be determined, but which at least consist of such explicitly encoded features as transitions, conjunctions, repetition, thematic tags, sequencing, and so on.

It appears that in spoken discourse the decoder, using an analysis-by-synthesis approach to language perception, supplies many of the cues necessary to establish

coherence. That is, decoders impose coherence on the discourse in keeping with their role as active participants in the language event. As discourse shifts to writing, however, the decoder's ability to impose coherence is reduced because his level of active participation is reduced. Hence, written discourse seemingly requires greater reliance on explicitly inscribed cues to guide the decoder in ascribing coherence to the text.

A greater reliance on cuing devices entails a subtle yet significant shift in the encoder's perception of the language event: not only must he be aware of what was meant, he must also be aware of what was said. That is, the encoder knows, tacitly perhaps, that he has a semantic intention and knows he must divide semantic intention into specific operations or propositional acts so that sub-sequences of actions relate linearly to each other and so that decoders can describe the discourse as hierarchical. On some level the encoder must sense that the discourse is what has here been identified as a hierarchy of actions, with semantic intention being the top node of the hierarchy and cues being key features of intention in action.

To distinguish between what one wants to do and what one is actually doing in discourse is not an easy task. Reconciling the two is at the heart of revision. It is difficult in part because it requires a sophisticated abstracting ability that enables the encoder to decontextualize the language event while simultaneously creating a context for the discourse and that enables the encoder to take on the role of the decoder. Yet our individual cognitive styles influence the way we commonly perform decontextualization and role-taking. Those with a field independent style generally are better at these tasks than are field dependents. The goal of this research, therefore, was to evaluate the influence of cognitive style on people's ability to produce coherent discourse.

Procedures

2.1. Research Hypotheses. The research hypotheses arise out of the operational rationale set forth in the introduction. They are listed below:

1) cognitive style affects coherence
2) subjects with field dependent cognitive styles will produce less coherent discourse overall than their field independent counterparts
3) decontextualization of the language event will yield a negative correlation between field dependency and coherence, but will yield no correlation between field independency and coherence
4) statistically, formulation of abstract intention is positively correlated with cognitive style
5) as discourse shifts from the oral to the written mode, it becomes more coherent

2.2. Selecting Subjects. On the basis of availability and willingness, an initial subject pool of 60 subjects was formed for the research. From this pool, 50 subjects were selected at random to participate in the study. Six subjects later dropped out of the research, which left a final subject pool of 44 subjects, all of whom were in their first term of college composition. All subjects were administered: 1) the Culture Fair Test of Intelligence; 2) the PF-16 Personality Assessment; and 3) the Group Embedded Figures Test. The results of these tests were used to evaluate intelligence, verbal ability, and cognitive style.

The subjects were told that as a part of the research they would be given questions that called for either a written or an oral response, and that some of the sessions might be tape recorded. Subjects were not told, however, when this might occur, in order to create one condition approximating spontaneous dialogue.

2.3. Conditions. There were five research conditions; three evoked oral responses and two evoked written responses. Each condition except Condition V was bimodal (for a total of 9 trials), consisting of stimuli designed to elicit a concrete and an abstract response following Britton's (1975) typology of report and high-level tautology. The first

four conditions shifted the situational context of the language event from spontaneous dialogue to formal dialogue with minimal feedback, to monologue, and then to writing. The purpose was to determine if decontextualization affects coherence. It was deemed important that the conditions be presented over several days, but of course this goal was largely dictated by subject availability. The interval between successive sessions ranged from a minimum of three days to a maximum of eight days. After all stimuli had been administered, each subject was debriefed. The research conditions are listed below:

Condition I: Spontaneous Dialogue
Condition II: Formal Dialogue with Minimum Feedback
Condition III: Monologue
Condition IV: Writing
Formulation of Intention

For the last condition, thirty-one subjects (those in the Los Angeles Area) were selected on the basis of availability. The subjects were shown a photo that depicted people sitting and standing near an abandoned building. They were then asked to write a story about the people in the photo, a story that explained what the persons were doing and why they were doing it. This stimulus was an adaptation of the tasks described in Flavel et al. (1968). Flavel and his associates tested the ability of children to formulate intention and to take on roles by having them learn board games.

The photographic stimulus would appear to be an even better device in terms of measuring successful formulation of abstract intention because it seemingly requires a deeper level of abstract identification: the subjects must first formulate an intention to assume the roles of the persons in the photograph, and then they must assume the role of the absent audience in order to determine "what the audience needs to know" if it is to understand what the picture is about. Since formulating intention appears to be central to coherence, this was deemed a valuable device for measuring cognitive style effect. No time limit was imposed.

2.4. Preparation of Data for Analysis. The Culture Fair Test of Intelligence and the PF-16 Personality Assessment were scored by computer, and the Group Embedded Figures Test was hand scored. Tape recordings were transcribed and verified by two assistants. The transcripts and the written responses were photocopied and then given to 10 readers for holistic scoring. The readers were unaware of the exact nature of the research but were experienced in holistic essay scoring and were or had been teachers of composition. The readers evaluated the coherence of the responses using Bamberg's (forthcoming) Holistic Coherence Scale. Each response was scored by three readers. Condition V (formulation of intention) was scored a second time by three additional readers in order to determine subjects' success at responding to the stimulus irrespective of coherence. Narrative detail seemed especially vital to success, and readers paid particular attention to descriptive vs. narrative performance. Methods for training readers, scoring responses, and maintaining interrater reliability followed established procedures. Interrater reliability was .81.

2.5. Data Analysis. IQ scores were converted to percentile equivalents, and raw cognitive style scores were converted to Sten scores. The raw data were stored on an IBM 3033 computer for analysis via the Statistical Analysis System (SAS).

The work of Witkin et al. (1954, 1962) and Kogan (1973) suggests a normal distribution for cognitive style, so the cognitive style data were normalized by determining the mean and the median. Scores ranged from 2 to 9, and the mean was 6. Those subjects with a cognitive style score less than 6 were classified as field dependent, while those with a score greater than 6 were classified as field independent. Subjects with a cognitive style score of 6 were classified as the norm group who could not be clustered by either field dependent or field independent behavior.

The SAS procedure PROC SORT sorted the data by cognitive style and clustered subjects by classification. The data set was then in the form of a factorial design that allowed hypothesis testing using various statistical methods.

Testing the research hypotheses involved formulating specific questions concerning the factorial design that can be answered via ANOVA and MANOVA procedures. These questions can be stated as follows:

1) Are there overall differences among the trials?
2) Are there overall differences between the groups?
3) Do cognitive style and coherence interact such that the trial differences depend on the cognitive style classification?
4) Ignoring cognitive style, is there a difference between trials?

After evaluating these questions, I ran various correlations and cross-tabulations to determine interactions via SAS procedures PROC CORR and PROC FREQ.

Results

3.1. Raw Scores. Subjects ranged in age from 17 to 58 years ($\bar{X}$ = 22.5). IQs ranged from a low of 78 (8th percentile) to a high of 142 (99+ percentile), with a mean of 113.4. Cognitive style Sten scores ranged from 2 (field dependent) to 9 (field independent). The mean was 6, and this was used as a norming value to allow for classification by field dependency. Based on Bamberg's (forthcoming) rubric for holistic evaluation of coherence, coherence scores ranged from a low of 0 (unscorable) to a high of 4 (fully coherent) on individual trials. Mean coherence scores across trials, on the other hand, ranged from 1.3 to 3.2 ($\bar{X}$ = 1.9). These data are summarized in Table 1:

Table 1

N = 44
MEAN AGE = 22.5
MEAN IQ = 113.4
MEAN CS SCORE = 6
MEAN COHERENCE SCORE = 1.9

3.2. Sorting by Cognitive Style. On the basis of cognitive style scores, subjects were sorted into three categories using a SAS sorting algorithm. The first category, FIELD DEPENDENT, contained 17 subjects (cognitive style scores $\leq$ 6). The second

category, FIELD INDEPENDENT, contained 15 subjects (cognitive style scores > 6). The third category, which was the norming group, contained 12 subjects (cognitive style score = 6).

3.3. Testing Hypotheses.

3.3.1. Determining Overall Significance of the Model. Before performing individual analyses on the data, it was necessary to evaluate the strength of the research hypotheses. This was accomplished through a variety of statistical procedures, of which multivariate and univariate analyses of variance were the most useful. Multivariate analysis war performed initially, since the model involved multiple variables. Two approaches were used. The first, SAS procedure GLM, uses the method of least squares to fit general linear models. It gave highly significant results ($F = 14.50$; $p < .0005$) that support the validity of the general model. The second procedure, MANOVA, served as a check on the initial results. Although slightly different, this method also yielded very significant results ($F = 3.56$; $p < .005$).

3.3.2. Testing Significance Between Groups. Satisfied that the research model was valid, it was possible to run a second MANOVA to determine whether there were significant differences in performance between groups, effectively testing the hypothesis of no overall cognitive style effect. Given the strength of the F and R-square values obtained for the test of overall significance ($F = 3.56$; $R^2 = .409$), we would expect equally significant results for this step. The probability factors and F values were very satisfactory ($p < .009$).

3.3.3. Testing Significance Between Groups Across Trials. When the interaction of cognitive style and coherence was evaluated on a trial-by-trial basis, several interesting variations appeared in the degree of significance across trials. That is, cognitive style did not appear to influence coherence uniformly.

Trial 3 (formal dialogue in the concrete mode) had an R-square value of only .187 and a probability of .33, both of which are statistically insignificant. Similarly, Trial 6

(monologue in the abstract mode) had an R-square of .286 and a probablity of .07, again insignificant. When we consider, however, that trials 1 through 8 represent paired elements of single experimental conditions, we note a pattern developing which suggests that individual trial results (at least for the first eight trials) must be interpreted in the context of the bimodal conditions. Trial 3, for example, with its lack of significance, is paired with Trial 4 (formal dialogue in the abstract mode), and the level of significance was high ($R^2 = .302$; $p < .05$). Likewise, Trial 6, with its low level of significance, is paired with Trial 5 (monologue in the concrete mode), where the level of significance was very high ($R^2 = .469$; $p < .001$).

3.3.4. Testing Significance of Overall Differences Among Trials. What these results suggest is the validity of the anticipated relationship between rhetorical mode, level of abstraction, and cognitive style. Exploring this relationship involved answering the question of overall differences among trials, which was most easily performed via univariate analysis of variance. The results proved highly significant ($p < .0001$).

3.3.5. Testing Significance of Dependent and Independent Variable Interaction. The next step in hypothesis testing was to determine whether cognitive style and coherence interact such that the trial differences depend on cognitive style classification. The interaction between the trial factor (coherence scores) and the cognitive style variable measures to what extent the differences in levels of coherence differ across groups. This was a crucial test, and the highly significant results ($p < .01$), further confirmed the research hypotheses.

3.3.6. Testing Differences Between Trials with Cognitive Style Blocked. The final question regarding hypothesis testing focused on blocking the cognitive style factor. That is, would we observe a difference between trials if cognitive style were not a variable? Performing this analysis involved creating an array matrix for the trials that allowed for a contrast between trials with cognitive style blocked. The results show that the model is very significant statistically ($F = 2.90$; $p < .0001$). In addition, and most

importantly, we note highly significant results for the contrast ($F = 16.35$; $p < .0003$), indicating that cognitive style indeed accounts for differences between trials.

3.4. Data Correlations and Cross-Tabulations. Once the research hypotheses had been confirmed, it was possible to begin individual analyses of various interactions between the subjects and their responses. One of the first questions, of course, involved possible correlations between cognitive style and such variables as coherence scores, age, IQ, and level of abstraction. Correlation coefficients are shown in Table 2 below:

Table 2

CORRELATION COEFFICIENTS/PROBABILITY

	Cognitive Style
Mean Coherence Score	0.37212 0.0129
Concrete mode	0.13080 0.3974
bstract mode	0.43908 0.0029
IQ	0.14593 0.3446
AGE	- 0.54085 0.0002

These results are very interesting for several reasons. We note, as expected, a strongly positive correlation between cognitive style and coherence ($p < .01$). The correlation coefficient (.372) corresponds satisfactorily with the R-square value (.409) obtained for overall cognitive style significance. Thus, the cognitive style variable accounts for roughly 40% of the variance in coherence scores.

Surprisingly, the correlation between cognitive style and IQ was insignificant ($p < .34$). Given the fact that IQ tests, especially the nonlinguistic sort used in the

research, tend to measure abstacting ability, we would intuitively expect a strong correlation here. Also, R. Cohen (1969) found that many standardized tests of intelligence and achievement, including nonverbal tests, assessed subjects' cognitive style. It seems o vious, therefore, that unknown factors are involved that differentiate what is measured by IQ and what is measured by cognitive style.

In terms of the level of discourse abstraction, cognitive style is an accurate predictor of coherence only at the abstract level ($p < .002$). The correlation coefficient for cognitive style and abstract discourse coherence was quite high (.439). Yet for concrete discourse it was statistically insignificant (.130; $p < .39$).

Cognitive style is a much better predictor, however, of coherence in discourse mode, i.e., either oral or written. For oral discourse, the correlation coefficient was moderately significant (2.81; $p < .05$), while for written discourse it was highly significant (.392; $p < .008$). Tables 3 and 4 below show the cross-tabulations for oral and written responses by cognitive style:

Table 3

TABLE OF COGNITIVE STYLE BY ORAL DISCOURSE

ORAL COHERENCE

COGNITIVE STYLE

Frequency Percent Row Percent Col Percent	LOW	MED	HIGH	TOTAL
Field dependent	10	7	0	17
	22.73	15.91	0.00	38.64
	58.82	41.18	0.00	
	58.82	35.00	0.00	
Norm	2	7	3	12
	16.67	58.33	25.00	
	11.76	35.00	42.86	
Field independent	5	6	4	15
	11.36	13.64	9.09	34.09
	33.33	40.00	26.67	
	29.41	30.00	57.14	
TOTAL	17	20	7	44
	38.64	45.45	15.91	100.00

Chi-square = 8.425
df = 4
$p < .07$

Table 4

TABLE OF COGNITIVE STYLE BY WRITTEN DISCOURSE

WRITING COHERENCE

COGNITIVE STYLE

Frequency Percent Row Percent Col Percent	LOW	MED	HIGH	TOTAL
Field dependent	7	9	1	17
	15.91	20.45	2.27	38.64
	41.18	52.94	5.88	
	77.78	33.33	12.50	
Norm	0	11	1	12
	0.00	25.00	2.27	27.27
	0.00	91.67	8.33	
	0.00	40.74	12.50	
Field independent	2	7	6	15
	4.55	15.91	13.64	34.09
	13.33	46.67	40.00	
	22.22	25.93	75.00	
TOTAL	9	27	8	44
	20.45	61.36	18.18	100.00

Chi-square = 14.897
df = 4
$p < .004$

These data suggest that coherence increases as subjects shift from oral to written discourse. To evaluate this possibility, a paired-comparison t-test was performed to determine the significance of variation as subjects moved from spontaneous dialogue to writing. The results were satisfactorily significant ($t = 2.12$; $p < .04$).

Perhaps most surprising, however, is the strong negative correlation ($p < .0002$) between cognitive style and age, a result which, if replicated in a larger sample, could have profound implications, owing in part to the fact that cognitive style has been considered to be a stable characteristic after about age 8 (see Yando and Kagan, 1968).

3.4.1. Age and Cognitive Style. To investigate these correlations further, several cross-tabulations were performed on the data. The inherently interesting negative

correlation between cognitive style and age was explored first. Since slightly more than half the subjects (n = 24) were between 17 and 19, the median rather than the mean was used to cluster age data into two categories consisting of those subjects 19 and under and those 20 and older. The results show that for this subject pool field dependency increased with age ($p < .001$).

3.4.2. Coherence and Cognitive Style. While the analyses of variance confirmed that discourse coherence is indeed affected by cognitive style, cross-tabulation provides a more detailed view of the interaction. Looking at cognitive style by mean coherence score shows how coherence varied according to cognitive style ($p < .02$). Only 5.88% of the field dependent subjects produced highly coherent discourse, whereas 41.18% produced highly incoherent discourse. This tendency reverses itself for the field independent subjects: 36.67% produced highly coherent discourse, while 16.67% produced highly incoherent discourse.

The lack of consistently positive correlations between cognitive style and performance on abstract and concrete linguistic tasks made it seem especially important to examine the cross-tabulations for this interaction. As stated in 3.4, the correlation between cognitive style and coherence during abstact responses was strongly positive (.439). We see further evidence of this when we cross-tabulate cognitive style by abstract task: 64.71% of the field dependent subjects produced highly incoherent responses and 35.29% produced moderately coherent responses ($p < .06$). What is most impressive, however, is the fact that not one field dependent subject produced a highly coherent response.

The results for field independent subjects were not so dramatic. Indeed, there was a relatively even distribution of responses by coherence. Of this group, 33.33% produced highly coherent responses, while 26.67% produced highly incoherent ones. Nevertheless, 73.33% at least produced discourse that was coherent, which is significantly more than for the field dependent subjects. It seems that perhaps the real difficulty here lies in the

sparseness of the subject pool; a larger sample would most likely produce more discriminate results.

When we contrast the interactions of cognitive style by abstract tasks with those for cognitive style by concrete tasks, we begin to see more clearly how cognitive style interacts with coherence for both abstract and concrete responses. First, field dependent subjects performed significantly better on concrete tasks than on abstract ones. Unfortunately, they still manifested difficulty producing coherent discourse, since only 17.65% had responses that were highly coherent. It is true, of course, that the probability factor is insignificant ($p < .20$), but that describes the predictability of the results, not the results themselves. The fact remains that in this sample, the field dependent subjects simply had difficulty producing coherent discourse, regardless of the task's level of abstraction.

3.4.3. Formulating Intention. Trial 9 was designed to measure subjects' abilities to formulate intention and to take on the role of another. It will be recalled that subjects were shown a photograph and asked to produce a story that explained what the people in the photograph were doing, and why. The degree to which subjects provided a narrative framework that indeed presented some rationale for the behavior of the people in the picture was deemed a measure of their ability to formulate nonperformative intention.

Several analyses were run on this variable. The first was a simple correlation between Trial 9 and cognitive style; the results were not statistically significant ($p < .49$). Although this indicated that other measures would also yield insignificant results, I performed a cross-tabulation and a t-test to determine chi-square and t statistic values. Again, the results were insignificant ($p < .8$; $t = -1.4151$).

Discussion and Conclusions

4.1. Strength of Results. The statistical vigor of the results was of course satisfying, for it confirmed the accuracy of the guiding hypotheses. The correlation between cognitive style and coherence, for example, was .372, which is outstanding. Furthermore, in testing the overall fit of the research model, the hypothesis of cognitive style effect proved quite strong ($F = 3.56$; $p < .005$); $R^2 = .409$). The R-square value is exceptional for behavioral studies, where R-squares typically are in the .2 to .3 range.

Such significant statistical measures indicate that cognitive style is indeed a causal factor for coherence, accounting for approximately 40% of its variability. Furthermore, field dependent subjects in the study were eight times more likely to produce discourse of low coherence than of high coherence. In addition, they were two and a half times more likely to produce discourse of low coherence than their field independent counterparts.

Of course, these results represent merely a first step in coherence research. More studies are needed because cognitive style is only one variable in a complex pattern of behavior. Although it is a very powerful variable, it still does not account for enough variance to allow for model building. That is, the remaining 60% of coherence variability must be explained in order to propose a full model for coherence. Rhetorical mode is probably another variable, but there most assuredly are others that have yet to be identified.

4.2. Surrogate Variable. In lieu of a model for coherence, we can propose cognitive style as a surrogate variable that accounts for a significant portion of what determines whether or not discourse will be coherent. It therefore has significant explanatory and predictive value, although unlike a model it cannot fully explain this aspect of linguistic behavior.

Based on the findings, it is possible to propose the following: First, coherence is a developmental phenomenon influenced significantly by cognitive style. Persons with a

functional, field dependent cognitive style will tend to produce discourse with less coherence than persons with a field independent cognitive style. We note furthermore that incoherent discourse manifests two related cognitive phenomena: 1) a person's inability to actualize prior intention through intention in action; 2) and/or his inability to decenter, to take on the role of another. While these phenomena are associated with cognitive style, the exact cognitive processes involved are not clear. One possible explanation, however, of field dependent linguistic behavior is that field dependents fail to abstract sufficiently to allow for movement along a hierarchy of intentions and actions. Without feedback from a contextual audience, therefore, they would have a hard time recognizing that their intentions have not been realized in their actions.

4.3. Context and Audience. As shown in 3.4, coherence increased as the subjects moved through the various experimental conditions from spontaneous dialogue to writing ($t = 2.23$; $p < .03$). This is significant because it fails to corroborate the frequently encountered supposition that incoherence is a phenomenon of written discourse but not of oral discourse. The increase in coherence might lead us to conclude that the field dependent subjects were successful at decontextualization, which is recognized as a salient characteristic of written discourse. Successful decontextualizat on would be important for several reasons. First, it would signal great improvement in abstracting. For this to be fully appreciated, one must keep in mind just how complex a process decontextualization is. The encoder lacks a contextual audience because he lacks a true context for the discourse. Thus, he must take on the role of whomever he imagines his audience will be and then create a context for that audience.

Part of this, of course—a major part, no doubt—consists of establishing a topic for the discourse. When we look closely at the results, however, we find that any conclusions based on the overall increase in coherence will be unjustified. Field dependent subjects, for example, consistently failed to identify topics. In spontaneous dialogue, such identification is not tremendously important because the discourse is directed to a

contextual audience that is also an active participant. In monologue and writing, however, identification of topic is vital to coherence, and yet the field dependent group tended to respond just as they would in a conversation. Furthermore, a comparative evaluation of tables 3 and 4 shows that while coherence did in fact increase overall as subjects shifted to writing, for field dependent subjects the increase was insignificant ($t = 1.02$; $p < .14$). That is, 58.82% produced oral discourse of low coherence, and zero percent produced oral discourse of high coherence. When they shifted to writing, 41.18% produced responses of low coherence, while 5.88% produced responses of high coherence, which represents an increase of one subject in the high coherence category. The field independent subjects, on the other hand, had substantially better success ($t = 3.09$; $p < .007$). Their performance was 33.33% low coherence and 26.67% high coherence for oral responses, while their performance was 13.33% low coherence and 40.00% high coherence for written responses.

What such performance suggests is that the field dependent subjects, unlike their counterparts, approached all linguistic stimuli with the same strategies—specifically with the assumption that the audience was an active participant in the linguistic situation. While the observation that some people fail to utilize rhetorical strategies is common in composition classrooms, the present findings represent the first time that this sort of behavior can be attributed to differences in cognitive processing. A limited perception of the sort documented here would make decontextualization extremely difficult. Furthermore, it seems natural to question, on the bases of the data, the degree to which field dependent discourse will have any perlocutionary force.

Comparing field dependent responses with those from the field independent group suggests that there is a lack of awareness concerning audience effect. It would be foolish to imply that these subjects do not know how to produce an effect or that they do not know how to argue. Some were my students, and I saw them do both while involved in conversations with me or their classmates. Is it possible, however, to conduct an

argument where there is no audience? Not in the usual sense. And yet the field dependent subjects generally tended to deal with the experimental stimuli as though they had contextual audiences, as in a dialogue. The result was that their discourse was not only incoherent, it was basically simple performance. The fact that they were producing words seems to have been enough for them. Of course, it should be noted that the stimuli did not explicitly ask subjects to produce an argument. It would be interesting to determine in future research if an explicit request would influence the perlocutionary force of field dependent discourse.

4.4. Intention. One important facet of this research involved measuring subjects' ability to formulate intention through a process of role-taking. Part of the inspiration for this portion of the study came from Flavel et al. (1968), who found that preoperational children had great difficulty in taking on the role of a noncontextual audience. The approach in Flavel et al., however, was much different from the one used here; they constructed a series of board games that they taught to various young subjects who then were asked to teach the games to others.

Obviously, the nature of my research made a similar approach extremely difficult; the time element alone made individual measurements using a board game unfeasible. I assumed, therefore, that an alternative method could be devised that would yield reliable results. On the face of it, this would appear to be an accurate assumption, and the task of developing a story to explain the actions of a group of people in a photograph seems to capture the kind of role-taking behavior reported in Flavel et al. (1968). It also seems to require formulation of nonperformative intention because the subjects were not attempting to get the audience to do anything.

Yet as shown in 3.4.3, there was no significance between cognitive style and Trial 9, the formulation of intention variable. All tests failed to establish any relationship between the two variables. The chi-square was 3.04 ($p < .80$), and the correlation coefficient was equally insignificant at .104 ($p<.49$). T was -1.415 ($p<.16$).

The facile explanation is simply that the variable failed as a measurement instrument and needs to be modified. This explanation, however, is unsatisfactory on at least two levels. First, there is no apparent reason for any such failure. The design is accurate, fully in keeping with the principles of intention and role-taking set forth in Flavel et al. (1968). Second, it does not account for the fact that the subjects simply could not respond appropriately to the stimulus. This in itself seems to be extremely interesting because it suggests behavior far more complex than we might initially imagine—specifically, that the subjects could not relate intention and role-taking to the narrative mode.

If we follow this line of thought, we suddenly realize that even Flavel's (1968) work evoked descriptions from subjects. Given that the subjects in the present study also produced descriptions in response to this variable, it seems reasonable to speculate that narrative may be a cognitively more complex task, one that calls for greater abstracting ability as well as more writing ability. Certainly there was no similar difficulty when in Condition III, for example, subjects narrated personal episodes. The personal element indeed seems to be at the heart of the matter, and such behavior clearly merits further investigation.

4.5. Composition Pedagogy. While any discussion of pedagogy must go beyond the strength of the findings, the educational emphasis on teaching coherence impells me to dare some speculation. My research fully supports the notion that coherence and meaning are not inscribed in a text. Indeed, it seems obvious that meaning cannot be inscribed because it always assumes the form of an inference from the acoustic or graphemic signal (see Kirsner and Thompson, 1976).

Inference, however, must be based on something, which suggests that a lack of textual cues will result in incoherent discourse. Phelps (forthcoming) adopts this position when she argues convincingly that failures in coherence occur either because encoders undercue—provide too few cues for decoders to grasp relationships between the various

parts of the discourse—or because they miscue—give contradictory or misleading cues. The present study found that one of the major components of the coherent responses was the presence of an explicitly identified topic. Without this, no amount of cuing via cohesive ties established a sense of coherence for the response.

It would seem reasonable to propose, therefore, that efforts to improve coherence by focusing on cohesive ties such as transitions are ineffective; teaching topic would have a greater impact. Such a proposal fails to recognize, however, the simple fact that topic is a part of language (i.e., writing) instruction, yet that instruction appears to have little or no effect on coherence.

Ultimately an instructor's ability to affect coherence becomes an empirical question, but what seems certain at this point is that the results presented here highlight the difficulty we face in teaching coherence, for we are dealing with a developmental phenomenon that the classroom is ill-prepared to handle, especially during a semester or a year of writing instruction. To establish topic, for example, an encoder must perceive the linguistic situation in sufficiently abstract terms to allow for categorizing the audience (is it contextual or noncontextual?) and intention (establishing a superordinate prior intention that includes intention in action). When dealing with coherence, in other words, we are confronting the way people perceive the world. For some people, their preferential mode of processing severely limits this perception.

To most educators, any such limitations are disquieting, perhaps because they impose equally severe limitations on the educational process. Therefore we are inclined to discount them and to place an inordinate faith in the innate competence of students to perceive the world as we do, once we show them what to look for. Piaget has termed this "magical thinking." We see it in Rosch's (1978) work on attribute categorization and classification, where she initially assumed that perception of attributes was basic to cognition. Thus, given an organism that has sensory equipment capable of perceiving attributes such as wings and feathers, it would be "a fact in the real world that wings and

feathers co-occurred." She quickly discovered that her initial assumption was incorrect, for her subjects had difficulty analyzing the nature of perceived attributes until they had developed a category system.

The development of the category system seems extremely important in regards to cognitive style, coherence, and pedagogy. The implication is that coherence follows from at least in part a sophisticated knowledge of rhetorical strategies and their attributes. Yet the field dependent responses were characterized by a pervasive absence of rhetorical strategies, for the subjects treated the various linguistic stimuli and the different rhetorical modes as though they were all one language event. These subjects also treated the various contexts as being identical. They assumed while writing, for example, that there was a contextual audience aware of what the stimulus was and why the response was being generated, just as though they were involved in dialogue.

But in talking about sophisticated knowledge of rhetorical strategies we are in a sense talking about abstracting ability, which ultimately defines not only the individual but the context as well. As Rosch (1978: 43) says, "The basic level of abstraction is that level of abstraction that is appropriate for using, thinking about, or naming an object in most situations in which the object occurs." Thus, as the subjects moved from spontaneous dialogue to writing, the context was no longer specified by the conditions, and they had to contribute their own context. It would seem likely that in the absence of a specified context subjects assumed what they consider the normal context or situation for occurrence of the linguistic event. With few exceptions, this took the form of a dialogue where the other participant was internalized.

It will be recalled that Colby and Cole (1976) found that they could induce good performance on abstract cognitive tasks through intensively explicit training and instruction. This offers hope that field dependent persons can be educated to deal more effectively with the level of abstraction required to produce coherent discourse. We should keep in mind, however, that the improved performance Colby and Cole report was

only for the specific tasks at hand. There was no measurable improvement in overall abstracting ability. What we can learn from this is that training in the use of specific devices, such as cognitive ties, will have an insignificant effect on coherence. What students need is more general instruction in categorizing, classifying, and inferencing. Furthermore, any such instruction can have little chance of success if limited to a semester or even a year of composition. In the final analysis, I suppose, what this means is that coherence—specifically in regards to writing—is an acquired characteristic, one that develops out of the much broader and as yet poorly understood domain of linguistic competence.

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